

EVALUATION OF PERMANENT FLOOD PLAIN EVACUATION IN THE CONTEXT OF WATERSHED MANAGEMENT PLANNING

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With the convergence of watershed management initiatives, the Corps environmental restoration program and a movement toward permanent flood plain evacuation measures the Corps has a unique opportunity to take a fresh look at how we evaluate flood damage prevention measures. In the context of comprehensive watershed management planning and for environmental restoration. Consequently, the US Army Corps of Engineers Institute for Water Resources commissioned a study to look at alternative ways to formulate and evaluate plans for permanent flood plain evacuation. Flood plain evacuation is normally not economically justified under the Principles and Guidelines and as a result WRDA 96 directed a study be conducted to examine impediments to the evaluation process. That study is underway under IWR's policy studies program. A concurrent study undertaken by IWR research program is to examine how, given the economic constraints of the current P&G, flood plain evacuation might be combined with possible environmental outputs and as a integral part of a watershed management plan to solve traditional flooding problems and other economic and social concerns. Follow on studies will attempt to provide examples of how tradeoffs among outputs, traditional monetized and non-monetized (environmental outputs) can be determined and used in the formulation and evaluation process on a watershed scale. Included will be a consideration of the complicated cost sharing issues which arise with multiple outputs which are monetized and those which are not. Obvious risk analysis implications related to uncertainties about flood prevention effects and environmental outputs both on site and off site.

Selected major findings of the IWR funded study, *Evaluation of Floodplain Permanent Evacuation Measures: An Alternative Approach for the US Army Corps of Engineers* by Leonard Shabman, Ann Riley and Gerald Stedje, are summarized below for the workshop participants consideration.

DEFINE A COMPREHENSIVE PROTOCOL

spatial scale large enough to evaluate the full range of hydraulic, hydrologic and ecological influences of any alternative, including the permanent evacuation measure, on the economy and the environment.

definition of planning problems and opportunities that recognizes multiple outputs from all water and related land management alternatives, including the permanent evacuation measure;

plan formulation that incorporates permanent evacuation as a measure, along with other structural and non-structural measures, into a complete alternative capable of addressing the full range of problems and opportunities in the watershed;

evaluation of alternatives using measures appropriate to the multiple decision criteria of economic efficiency (NED), environmental outcome, fiscal impact, and equity;

collaborative decision making by government and non-government organizations who select a preferred alternative in consideration of measured tradeoffs among decision criteria.

shared responsibilities across governmental and non-governmental organizations for the institutional and financial requirements for implementation.

Seek Common Understanding of the Protocol Throughout the USACE

The USACE has moved its policy and programs to align closely with the new national themes of ecological restoration and watershed management. These movements will facilitate the adoption of the comprehensive protocol for permanent evacuation measures. However, even though the agency has issued guidelines for restoration planning and policy, the applications in the field, and the relationship of the new restoration programs, to current USACE planning rules and decision processes is not well understood. Because the comprehensive protocol is the logical result of the changes set in motion by the EC, the USACE needs to focus significant resources on fully exploring the implications of the guidance and for assuring that the implications are understood and accepted at *all* levels of the agency. Otherwise there will continue to be barriers to a USACE consideration of the full merits of permanent evacuation and practice will continue in conflict to policy.

Recognize that Restoration Describes a Type of Water and Related Lands Management Measure

The comprehensive evaluation protocol describes water control and restoration as different but equally valid types of water management measures. The traditional USACE water control measure altered watershed hydrology, wetlands and riparian areas. Restoration describes measures to reverse the effects of these past development projects in order to replicate some prior hydrologic regime, to re-create some historic riparian zone or re-flood some drained wetland. These “restoration” measures might require engineering and construction activity and will return some “historic” watershed condition in the riparian zone or in the whole watersheds hydrologic regime.¹ Permanent evacuation is one possible restoration measure, because it allows for a return of the natural hydrologic and ecological functions of flood plains. It should not be the case that evacuation and floodplain restoration are considered as tradeoffs to risk reduction project objectives but as legitimate measures to reach these objectives. Also, evacuation may need to be integrated with other measures to form a complete alternative.

Emphasize the Multiple Outputs of Permanent Evacuation as a Restoration Measure

The comprehensive evaluation protocol recognizes that multiple outputs may accrue from any measure, including permanent evacuation. With this understanding, outputs of permanent evacuation should be understood as occurring both on the site and away from the site, to include:

- reducing the evacuated watershed occupants' hazard of flood induced property damage or personal harm
- reducing the costs of flood damage shifted to others (externalized cost)
- reducing the hazard of flood induced property damage or personal harm in other areas of the watershed by altering water flow conveyance or storage at the site of the permanent evacuation
- creating improvements in ecological functions and services from the watershed including enhanced water supply, recreation, fish and wildlife populations, improved water quality parameters, storm water management, as well as other services of interest to watershed stakeholders.

Formulate Plan Increments as Bundled Measures

During plan formulation, measures should be bundled together and evaluated as packages of measures that can address watershed problems and opportunities. There is no inherent reason that measures can not be bundled together as inseparable elements (for example, to maintain contiguous housing and community cohesion) and then evaluated as an increment.

Currently, the USACE evaluation procedures expect that permanent evacuation be justified as an added increment to other measures and that evacuation itself be justified property by property. However, focusing analysis on evacuation in isolation and then on each structure can leave a partially evacuated landscape that may be antithetical to achievement of other planning objectives. An alternative approach would be to “bundle” together structures located in different areas of the floodplain, and to “bundle” evacuation with other measures as alternative ways to address the full range of watershed problems and opportunities. Then incremental evaluation would be made for the bundled measures.

Employ a Multi-Objective Planning Framework

At present, a USACE expenditure must maximize NED subject to meeting environmental constraints set in law and regulation. An exception only can be granted by the Secretary of the Army. Such a narrow perspective would be inconsistent with the comprehensive evaluation protocol. However, the USACE restoration guidance allows budgeting for a project when that project does not maximize NED, if the forgone NED is to achieve environmental restoration outputs. The USACE should recognize that this exemption is the equivalent of a re-introduction of a portion of the *E.Q. account* (environmental quality) as a co-equal objective in the spirit of the 1973 P&S.

This does not mean that the USACE would budget for measures to address all the multiple criteria; however, analyses based on these criteria may be a contribution of the USACE to collaborative planning and shared implementation that has become the goal of watershed planning.

While there are multiple objectives that govern planning, a USACE effort to measure all possible effects under all objectives would strain the analytical resources of the agency. Therefore, the analytical reviews of permanent evacuation should be limited to matters of greatest decision making concern identified in the case studies.

Clarify NED/E.Q. Protocols for Plan Selection

Evaluation in each account is done in relation to specified criteria that require a unique analytical approach. Then tradeoffs among objectives are recognized and made. The tradeoff explicitly described in the restoration guidance is between net NED and E.Q. outputs. If increased E.Q. outputs comes at the expense of NED, the USACE restoration planning guidance calls for an incremental analysis to display and justify NED costs incurred to satisfy increased E.Q. outputs represented in non-monetary terms. The USACE should further clarify some of the measurement approaches that are required to implement this analytical framework.

Review Critical Assumptions Of On-Site NED Benefits for Permanent Evacuation

In considering the *on-site* NED benefits of permanent evacuation the P&G makes the assumption that land market traders have the same hazard information as would be used in a USACE flood frequency and property damage analysis. The P&G also assumes that traders are risk neutral, use the hazard information in the same way as the USACE planners and use the same discount rate in considering future damage costs. The P&G also assumes that the NIP is fully in effect in the area where the permanent evacuation is to take place, mitigating against moral hazard problems from the disaster assistance and flood insurance programs. The practical effect of these assumptions is to support the conclusion that the land market price is fully discounted for flood hazard. As a result, the NED cost of permanent evacuation is the fair market value of the land and improvements. The NED benefits for flood hazard reduction *at the site* are limited to avoided insurance subsidies, avoided administrative costs for the insurance program and the NED value that arises from the new land use (e.g. open space recreation benefits).

Recognize Off-site NED Benefits from Evacuation

Current practice, although not a requirement of the P&G, is to ignore the effects of permanent evacuation away from the immediate site. However there can be hydrologic and economic linkages between the evacuated site and other areas that should be addressed when evaluating the full NED benefits of the permanent evacuation. The USACE should develop guidelines for, and require computation of, such NED benefits from evacuation. As one example recognized by the P&G, property value enhancement from proximity to open space can accrue to lands adjacent to the evacuated site. Numerous communities have undertaken projects to further develop tourist-based businesses based on “river walks,” and river town identities and this may

increase property values adjacent to the evacuated site.

Clarify the Opportunities Offered by Individual Project Authorization Language

Conflicts between USACE planning, authorization and appropriations schedules and community desires to reformulate plans often occurred in the case studies. The need for the USACE to move through a sequence of Congressional authorizations for individual projects is well understood. However, the USACE field offices often saw this requirement in ways that created an obstacle to collaborative plan formulation.. Given the broad authorities inherent in any study resolution, the USACE need not secure new authorization to consider evacuation options or restoration of floodplain areas as an approach to addressing water management problems and opportunities.

Contribute to Collaborative Planning

The comprehensive evaluation protocol emphasizes the need to involve all stakeholders and interested parties throughout the planning process. The resulting plan is expected to be implemented by a collaboration among government agencies, non-government organizations and citizens. Of course, the USACE has always worked with a local project sponsor to secure project authorization. Still there have been cases where the USACE was unable to plan in collaboration with others.

Reform Project Level Cost Sharing

At present cost sharing differs according to the output of the project; flood hazard reduction has different cost sharing than recreation, for example. Therefore there is a need to allocate projects costs among the different outputs so that the cost sharing rules can be applied. The USACE will need to develop cost allocation rules that apply to different project outputs when all outputs are not measured in monetary terms.

Conclusion

The USACE traditional planning approaches, if properly applied, can encompass the fundamental elements of the comprehensive evaluation protocol that will be needed to more completely recognize the benefits and costs of permanent evacuation. However, the planning process in the last two decades has become too narrowly focused and inflexible, perhaps in response to restrictive budget and agency priorities. There will need to be new reforms, proposed reforms, and clarification of the reforms that have already been undertaken.

If the USACE moves toward the comprehensive evaluation protocol the challenge will not be one of technical analysis and planning philosophy (the USACE has the tools). The central challenge will be to understand that the USACE is a partner in a collaborative process of decision making, and shared implementation for a “watershed plan” that may incorporate permanent evacuation as one measure.

